

# Claims

[c1] What is claimed is:

1. A laser power control circuit used for controlling the laser power of an optical pick-up unit (OPU), the laser power control circuit comprising:

at least one sample/hold circuit electronically connected to the OPU for sampling and holding a front photodiode output signal to generate an analog feedback signal;

at least one analog-to-digital converter (ADC) electrically coupled to the sample/hold circuit for transferring the analog feedback signal into a digital feedback signal;

and

at least one digital control circuit electrically coupled to the ADC for generating a power control signal and outputting the power control signal to the OPU in order to control the laser power of the OPU;

wherein the front photodiode output signal corresponds to the laser power of the OPU.

[c2] 2. The laser power control circuit in claim 1, wherein the digital control circuit comprise:

an initial value transform circuit used for transforming a digital target feedback signal into an initial power con-

trol value to initialize the power control signal; and  
a compensation circuit used for generating a compensation value according to the difference between the digital feedback signal corresponding to the initial power control value, and the digital target feedback signal so as to adjust the power control signal.

[c3] 3. The laser power control circuit in claim 2, wherein the control unit further comprises:

an adder electronically connected to the initial value transform circuit and the compensation circuit for calculating the sum of the compensation value and the initial control value so as to set up the power control value.

[c4] 4. The laser power control circuit in claim 2, wherein the control unit further comprises a digital filter electronically connected to the compensation circuit for filtering the digital feedback signal.

[c5] 5. The laser power control circuit in claim 2, wherein the control unit further comprises a gain setting circuit for setting the gain of the compensation circuit, and the compensation circuit generates the compensation value according to the gain value and the difference.

[c6] 6. The laser power control circuit in claim 1, wherein the digital control circuit limits the value of the power con-

trol signal within a specific range.

[c7] 7. The laser power control circuit in claim 1, wherein the power control signal is a digital signal.

[c8] 8. The laser power control circuit in claim 1, further comprising a plurality of sample/hold circuits electronically connected to the OPU and corresponding to the plurality of predetermined output power values, respectively, wherein if the laser power control circuit is to drive the OPU to output a predetermined output power, the sample/hold circuit corresponding to the predetermined output power is activated.

[c9] 9. A method for controlling the power of an OPU, the method comprising:  
sampling and holding a front photodiode output signal to generate an analog feedback signal;  
transforming the analog feedback signal into a digital feedback signal; and  
generating a power control signal according to the digital feedback signal, and outputting the power control signal to the OPU so as to control the laser power of the OPU;  
wherein the front photodiode output signal corresponds to the laser power of the OPU.

- [c10] 10. The method in claim 9, wherein the step of generating the power control signal further comprises:  
calculating and outputting a power control signal according to the digital feedback signal.
- [c11] 11. The method in claim 10, wherein the step of calculating the power control value further comprises:  
initializing the power control value using an initial power control value; and  
generating a compensation value to the initial power control value according to the difference between the digital feedback signal corresponding to the initial power control value and the digital target feedback signal so as to adjust the power control value.
- [c12] 12. The method of claim 11, wherein the step of adjusting the power control value comprises calculating the sum of the compensation value and the initial power control value so as to set the power control value.
- [c13] 13. The method of claim 11, wherein the step of calculating the power control value further comprises filtering the digital feedback signal.
- [c14] 14. The method of claim 11, further comprising setting a gain, wherein the step of calculating the power control value further comprises generating the compensation

value according to the gain and the difference.

[c15] 15. The method of claim 14, wherein the step of setting the gain further comprises:

driving the OPU using a first power control value and a second power control value;

reading a first digital feedback signal corresponding to the first power control value and a second digital feedback signal corresponding to the second power control value; and

calculating the gain according to the first power control value, the second power control value, the first digital feedback signal, and the second digital feedback signal.

[c16] 16. The method of claim 14, wherein the step of setting the gain further comprises:

calculating the gain according to the first power control value, the second power control value, the first digital feedback signal, the second digital feedback signal, and a specific value.

[c17] 17. The method of claim 14, wherein the step of setting the gain further comprises:

reading an optical recording medium according to a plurality of predetermined gains;

recording a plurality of the error values and jitter values corresponding to the plurality of predetermined gains;

and

selecting one predetermined gain among the plurality of predetermined gains as the gain according to the plurality of error values and jitter values.

- [c18] 18. The method of claim 14, wherein the step of setting the gain further comprises:  
using at least one power control value to continuously drive the OPU so as to make the laser power reach a specific magnitude before using the first and second power control value to drive the OPU.
- [c19] 19. The method of claim 18, wherein the step of continuously driving the OPU comprises using a plurality of power control values in sequence to drive the OPU, wherein a next power control value is larger than a present power control value, and the value of the digital feedback signal corresponding to the last power control value is larger than a predetermined value.
- [c20] 20. The method of claim 9, wherein the step of generating the power control signal further comprises limiting the value of the power control signal to a specific range.
- [c21] 21. The method of claim 9, wherein the step of sampling and holding the front photodiode output signal further comprises:

providing a plurality of sample/hold circuits, which correspond to a plurality of predetermined output powers of the OPU; and

controlling the OPU to output a predetermined output power and activating a sample/hold circuit corresponding to the predetermined output power.

[c22] 22. The method of claim 9, further comprising a step of holding the power control signal.